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(54) AN AIR FILTERING APPARATUS

(71) We, DRAGERWERK AKTIENGESELLSCHAFT, a German company, of Moislinger Allee 53/55, 2400 Lubeck, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

According to the present invention there is provided an air filtering apparatus, comprising a filter which is of air-permeable material of a character to filter bacteria from the air and has an upstream surface and a downstream surface, and an ultraviolet radiator which is arranged to emit ultraviolet radiation towards one of these surfaces and to irradiate the whole of that one of these surfaces.

By means of the invention, it is possible to prevent bacteria from being present in the air leaving the filter.

Advantageously, the ultraviolet radiator is upstream of the filter and is arranged to emit ultraviolet radiation towards said upstream surface, thus to irradiate the whole of said upstream surface. Moreover, another ultraviolet radiator may be arranged downstream of the filter and be arranged to emit ultraviolet radiation towards said downstream surface, thus to irradiate the whole of said downstream surface.

If it is undesirable that the outgoing air should contain ozone produced by the ultraviolet irradiation, a gas filter for the removal of ozone is arranged at the air outflow side of the apparatus. It is the advantage of this embodiment that the apparatus can be operated for long periods of time without the ozone content in the outgoing air exceeding the permissible TLV (Threshold Limit Value).

The material of the filter for bacteria may consist of hydrophobic glass fibre paper.

Furthermore, it is expedient that the power of the ultraviolet radiator(s) should be so high that the radiation penetrates into the interior of the material of the filter for bacteria. In this way, it is still more reliably ensured that any bacteria reaching the filter material, and perhaps growing there when a nutrient medium is available, will be destroyed.

The filling substance of the gas filter may consist of active carbon, with or without impregnation, and/or an oxide or oxides of copper and/or manganese and/or chromium and/or iron and/or another metal of a high specific weight. In another embodiment, the filling of the gas filter comprises a substance having a large active surface, *i.e.* a specific surface of at least 200 $m^2/g.$, such as silica gel or active alumina. The first-mentioned substances may also be used in combination with the substances mentioned as having a large surface, such as silica gel or active alumina. These substances remove the ozone from the air flowing through the gas filter.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawing, which shows a diagrammatic view of an air filtering apparatus.

Referring to the drawing, the apparatus includes an air conduit 1 in which is connected an air feeder 2 supplying air sucked in from the exterior to the conduit 1 and thence for example to an operating theatre (not shown). Arranged in the air conduit 1 is a high-efficiency filter 3 for suspended material, the filter being of air-permeable material, such as hydrophobic glass fibre paper. Installed in the chambers upstream and downstream of the filter 3 are ultraviolet radiators 4 and 5 which respectively irradiate the whole of the upstream and downstream surfaces of the filter. Finally, there is also arranged in the air conduit 1 at its air outflow side a gas filter 6 comprised of the aforedescribed substances. The air enters the operating theatre free from ozone, and purified from all suspended materials such as inorganic and organic dust, bacteria and viruses, since these suspended materials are removed by the air-permeable material of the filter 3.

As the filling of the gas filter 6, there

may be employed a mixture of copper and manganese oxides already known in the respirator art, where it is employed for the catalytic oxidation of CO.

Owing to the destruction of the bacteria deposited on the filter, the filter for suspended material may remain in the apparatus throughout its entire service life. The expression "service life" applied to a filter of suspended material is to be understood to mean the time throughout which the resistance of the filter for suspended material to the passage of air remains below a predetermined limit value.

Owing to the increasing deposition of dust particles, the resistance to air of a filter for suspended material increases in course of time. The service life of a filter for suspended material is thus determined only by the increasing soiling of the filter. A considerable increase in air resistance in a filter for suspended material employed for example in the ventilation of hospital accommodation takes place only after a period of time which is very much longer than observation has shown is required for the growing of bacteria through the filter. Thus, utilisation of the apparatus described has the effect that it becomes possible to employ in the ventilation of hospital and other sterile accommodation a filter for suspended material having the same service life as is generally conventional in the filter art.

WHAT WE CLAIM IS:—

1. An air filtering apparatus, comprising a filter which is of air-permeable material of a character to filter bacteria from the air and has an upstream surface and a downstream surface, and an ultraviolet radiator which is arranged to emit ultraviolet radiation towards one of these surfaces and to irradiate the whole of that one of these surfaces.

2. An apparatus as claimed in claim 1, wherein said radiator is disposed upstream of the filter and is arranged to emit ultraviolet radiation towards said upstream surface, thus to irradiate the whole of said upstream surface.

3. An apparatus as claimed in claim 2, and further comprising another ultraviolet radiator which is disposed downstream of the filter and is arranged to emit ultraviolet radiation towards said downstream surface, thus to irradiate the whole of said downstream surface.

4. An apparatus as claimed in any preceding claim, and further comprising a gas filter which serves for the removal of ozone and which is disposed at the air outflow side of the apparatus.

5. An apparatus as claimed in any preceding claim, wherein said filter which serves to remove bacteria comprises hydrophobic glass fibre paper.

6. An apparatus as claimed in any preceding claim, wherein the radiating power of the or each radiator is so high that its ultraviolet radiation penetrates into the interior of the material of said filter which serves to remove bacteria.

7. An apparatus as claimed in claim 4, or claim 5 or 6 as appended to claim 4, wherein said gas filter comprises active carbon and/or an oxide or oxides of one or more metals of a high specific weight.

8. An apparatus as claimed in claim 7, wherein said metals are copper, manganese, iron and chromium.

9. An apparatus as claimed in any preceding claim, wherein said gas filter comprises a material having a large active surface.

10. An apparatus as claimed in claim 9, wherein said material having a large active surface comprises silica gel or active alumina.

11. An air filtering apparatus, substantially as hereinbefore described with reference to the accompanying drawing.

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1382820 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*